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HOW DOES THE DEVELOPMENT LEVEL OF COUNTRIES AFFECT OPTIMAL SIZE OF GOVERNMENT: AN EMPIRICAL STUDY WITH PANEL DATA ANALYSIS

Chaşrtime Makalesi/Research Article

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ABSTRACT

This study aims to clarify whether there is an optimal government size and, if there is any, to determine whether it changes according to the development level of the countries. Estimations in terms of these research questions were analyzed with the help of the Armey Curve. The economic growth rate was used as a dependent variable, and the annual public expenditure ratio in GDP, gross fixed capital formation, and the unemployment rate were used as independent variables. Additionally, a dummy variable was employed for the effects of the 2008 Global Financial Crisis. The data were obtained from the World Bank database. 21 countries' data for the period 1990-2019 were analyzed with AMG Panel Data Analysis. According to the findings of the study; the existence of optimal public expenditure value was confirmed in 18 countries except for Spain, Mexico, and Colombia. It was observed that the average optimal public size is 30.67% in developed countries and 25.43% in developing countries. These results are consistent with Wagner's (1882) argument and Keynesian view. As a result; it is possible to argue that as the development level of the countries increases, so does the public size within the economic structure.

Keywords: Growth, Gross Fixed Capital Formation, Public Spending, Armey Curve, AMG Panel Data Analysis.

ÜLKELERİN GELİŞMİŞLİK SEVİYESİ OPTİMAL KAMU BÜYÜKLÜĞÜNÜ NASIL ETKİLEMEKTEDİR: PANEL DATA ANALİZİ İLE UYGULAMALI BİR ÇALIŞMA

ÖZ

Bu çalışmanın ana amacı kamu harcamalarının optimal bir değerinin olup olmadığı; varsa bunun ülkelerin gelişmişlik seviyesine göre değişip değişmediğini test etmektir. Bu araştırma sorulan, Armey Eğrisi yardımıyla analiz edilmiştir. Çalışmanın bağımlı değişkeni ekonomik büyüme oranı; bağımsız değişkenleri ise kamu harcamalarının milli gelir içindeki payı, sabit sermaye oluşumu ve işsizliktir. 2008 Küresel Finansal Krizin etkilerini de yansıtmak amacıyla da kukla değişken kullanılmıştır. Veriler Dünya Bankası veri tabanından temin edilmiştir. Çalışmada 21 ülkeye ait 1990-2019 dönemi verileri, AMG Panel Veri Analizi yardımıyla tahmin edilmiştir. Çalışmadan elde edilen bulgulara göre; İspanya, Meksika ve Kolombiya hariç diğer 18 ülkede optimal kamu harcaması değerinin varlığı doğrulanmıştır. Bununla birlikte gelişmiş ülkelerde optimal kamu büyüklüğü ortalamasının GDP'nin %30.67'si, gelişmekte olan ülkelerde ise bu değerin %25.43 olduğu gözlenmiştir. Bu sonuçlar Wagner (1882)'in savı ve Keynesyen görüş ile tutarlılık içinde olup; ülkelerin gelişmişlik düzeyi arttıkça, iktisadi yapı içinde kamu büyüklüğünün artığım söylemek mümkündür.

Anahtar Kelimeler: Büyüme, Sabit Sermaye Oluşumu, Kamu Harcamaları, Armey Eğrisi, AMG Panel Veri Analysis.

1. INTRODUCTION

It has been observed that in the historical process both the size of the states and the regulatory role they play in economic structure have changed depending on their forms of government and respective preferences. In other words, the approach of every school of economic thought with regards to the problem of "to what extent should States be involved within the economic structure" is different. According to the classical school of economics, there are natural laws that govern the economic structure, and therefore, it has been argued that markets might reach an equilibrium

against possible shocks through the “invisible hand”. As is well-known, supporters of the classical school criticize the regulatory role of the state in the economy (Screpanti and Zamagni, 1993; Ersoy, 2008) and emphasize the drawbacks of state intervention, such as loss of efficiency and crowding-out of private sector investments.

Although there are studies on the optimal value of government expenditures, there seems to be no consensus on the optimal value yet. According to Friedman (1997), who is one of the first pioneering researchers, the optimal value is noted as a ratio of 15-50% of GDP. Therefore, it is deemed important to identify the reasons for the varying ratios of optimal value between different countries and whether differences in ratios can be explained in terms of development levels of respective countries. In that sense; it is the aim of this study to explore the above-mentioned question and to contribute to the existing literature on the subject.

To that end initially, the conceptual framework of the study is structured and literature reviews are discussed. Following the process, the methodology of the study is elaborately explained. Thereafter empirical findings are presented, together with the conclusions, recommendations, and future implications.

2. CONCEPTUAL FRAMEWORK

Wagner (1883) denoted a causality from economic growth to public expenditures (Henrekson, 1993). In his “Zaw *oWIgcreacingndate Activities”,* Wagner contended that an increase in real income will lead to an increase in individuals’ spending on education, security, and culture, and consequently, this will lead to an increase in government spending. (Chobanov, 2009). He also declared that the involvement of the state in the economy will gradually increase in proportion to the requirement on the improvement of infrastructure to meet the needs of the developing industry.

After the outbreak of the Great Depression in 1929, the economists who followed John Maynard Keynes argued that the state should actively intervene in the economy as a regulator when it was seen that the markets did not reach an equilibrium by themselves as classical economists had previously put forward. Keynes pointed out causality from government spending to growth (Minsky, 1975), and therefore, the involvement of the state in the economic structure will lead to economic growth (Ram, 1986). In other words, it was argued that some investments made by the state in infrastructure, education, health, and other social fields will positively impact economic growth.

Stiglitz's (1996) study on East Asian countries, the United States and developed industries also seems to be consistent with Wagner’s (1883) view. When the findings of the studies conducted by Stiglitz (1996) were analyzed, it was observed that when necessary infrastructure was built by the state, it ensured cost efficiency and increased competition in developed industries and that technology evolved and improved through R&D investment incentives. From this point of view, it is clear, especially in the emerging economies, that the state should act as a regulator in the economy to improve the economic structure for international competition.

Once the involvement of the state in economic life has been accepted, the question of to what extent and how it should take place in the economic structure has come to the fore. In this framework, the following Table 1 was created to review the government spending in national income on a regional basis. In terms of government spending, it has been established that the EURO Area has the largest share with 47.93%, followed by other advanced economies with 39.26%. On the other hand, Sub-Saharan Africa has the lowest share with 22.32%. It can be said that this table is consistent with Wagner’s (1883) and Keynesian views.

Table 1. The Ratio of Public Expenditure in GDP

Years	Advanced Economies	EURO Area	Developing Countries	Asian-5	Latin America	Middle East - Central Asia	Sub-Saharan Africa
2000	-	46.83	24.591	19.303	26.085	24.052	21.823
2001	37.131	46.823	25.808	21.737	26.561	25.916	23.594
2002	37.798	47.141	26.367	21.524	26.663	28.241	20.925
2003	38.507	47.466	26.561	20.595	28.296	26.993	22.542
2004	38.146	46.939	25.809	19.982	27.216	27.487	21.505
2005	38.029	46.911	25.873	19.659	28.598	25.812	21.996
2006	37.635	46.271	26.062	19.905	29.448	25.877	20.523
2007	37.883	45.529	26.441	20.456	29.692	26.307	22.474
2008	39.777	46.771	28.408	20.643	31.429	28.756	22.751
2009	43.549	50.875	30.041	21.144	32.064	32.504	23.816
2010	42.365	50.803	29.356	20.129	33.149	30.189	24.023
2011	41.52	49.337	29.343	20.029	32.892	29.412	23.95
2012	40.848	49.909	29.804	21.286	32.9	30.55	23.298
2013	40.258	49.839	29.965	21.266	32.895	31.396	22.977
2014	39.658	49.215	30.233	20.703	33.856	32.885	22.7
2015	38.773	48.363	30.768	20.222	32.87	33.328	21.523
2016	38.682	47.653	30.63	19.336	32.747	32.349	20.84
2017	38.319	47.094	30.104	19.132	32.567	30.476	21.68
2018	38.419	46.852	30.539	19.45	32.269	30.335	21.471
2019	38.685	47.04	31.04	19.972	31.43	30.288	21.559
X	**39.26221**	**47.93847**	**28.58695**	**20.37737**	**30.92326**	**29.42637**	**22.32353**

Source: IMF World Economic Outlook Database, 2021.

Table 2 is intended to make a comparison between developed and developing countries. Table 2 shows that the share of government spending in national income varies in the range of 23- 60%. The average government size of developed countries seems to be between 39-46% of GDP, while it is between 37-46% of GDP in developing countries.

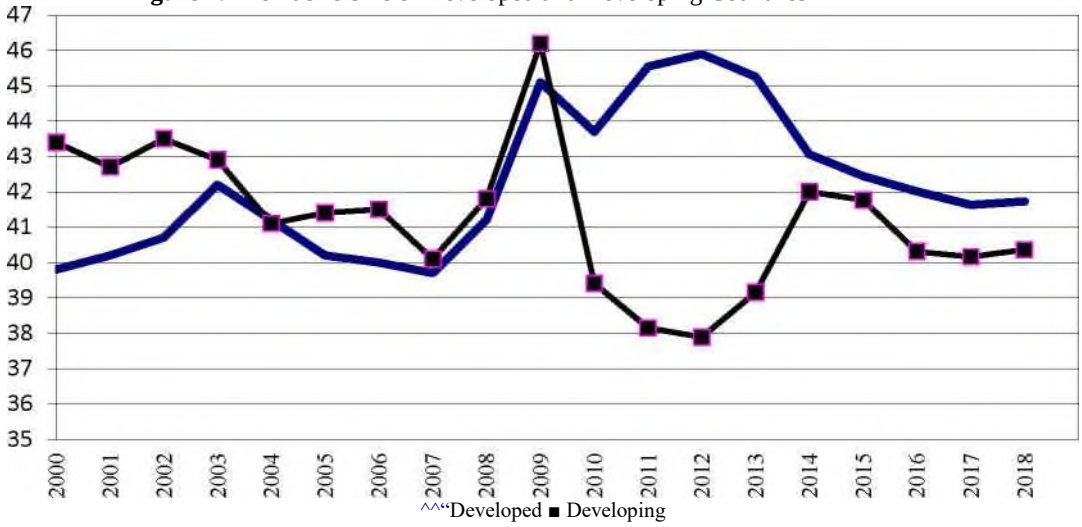
Table 2. Public Size of Some Selected OECD Countries

Countries		Public Expenditure (% of GDP)									
		2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
	UK	35.3	36.4	37.6	38.8	40.0	41.3	40.8	41.0	44.3	47.2
	France	51.7	51.7	52.8	53.3	53.0	53.3	52.9	52.6	53.3	57.2
	Germany	47.8	47.4	47.9	48.3	46.8	46.8	45.2	43.4	44.2	48.2
Developed		-	-	-	-	-	35.5	35.0	35.1	36.7	40.7
Countries		23.6	25.2	24.8	31.1	28.1	27.9	28.6	28.0	29.8	32.3
	Spain	39.1	38.4	38.6	38.4	38.8	38.5	38.4	39.3	41.4	46.2
	Netherland	42.2	42.9	43.6	44.5	43.5	42.2	43.0	42.3	43.1	47.6
	USA	34.3	35.6	36.7	37.3	36.9	37.0	36.7	37.4	39.8	43.3
	X	**39.8**	**40.2**	**40.7**	**42.2**	**41.2**	**40.2**	**40.0**	**39.7**	**41.2**	**45.1**
	Poland	42.0	45.0	45.3	45.7	43.6	44.2	44.4	42.9	44.0	44.8
	Slovenia	47.5	48.7	47.3	47.2	46.6	46.5	45.5	43.4	45.1	49.4
	Hungary	47.3	47.3	51.0	49.1	48.8	49.4	51.4	49.9	48.8	50.7
Developing	Slovak Rep	52.8	45.3	45.4	40.4	37.9	39.7	38.8	36.4	37.0	44.4
Countries		40.8	43.0	44.7	49.1	42.3	42.0	41.1	40.2	40.4	43.9
	Estonia	36.3	34.9	35.9	35.0	34.1	33.7	33.4	33.7	39.4	45.6
	Latvia	37.2	34.7	35.0	33.5	34.6	34.1	35.9	34.0	37.6	44.3
	X	**43.4**	**42.7**	**43.5**	**42.9**	**41.1**	**41.4**	**41.5**	**40.1**	**41.8**	**46.2**
	Years	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
	UK	47.25	45.76	45.60	43.91	43.09	42.31	41.52	41.12	40.94	-

Developed Countries	France	56.88	56.29	57.11	57.23	57.21	56.80	56.59	56.33	55.86	-
	Germany	48.14	56.26	57.11	57.23	44.30	44.04	44.30	44.42	44.57	-
	Japan	36.91	40.91	40.69	40.83	40.29	39.44	39.23	38.78	38.95	
	S. Korea	26.90	30.38	30.80	30.13	30.42	30.40	30.30	30.27	31.15	-
	Spain	46.03	46.15	48.66	45.83	45.11	43.89	42.44	41.20	41.72	-
	Netherland	47.86	46.79	46.75	46.52	45.74	44.61	43.58	42.45	42.06	42.02
	USA	43.11	42.05	4023	39.01	38.35	37.94	38.26	37.99	37.83	-
	X	**43.69**	**45.54**	**45.90**	**45.25**	**43.06**	**42.44**	**42.1**	**41.63**	**41.73**	**42.02**
Developing Countries	Poland	45.76	43.92	43.02	42.86	42.39	41.68	41.11	41.22	41.54	-
	Slovenia	50.18	50.86	49.35	60.27	50.84	48.71	46.23	44.06	43.55	-
	Hungary	48.91	49.12	49.25	50.16	50.21	50.64	47.20	46.97	46.69	-
	Slovak Rep	42.14	41.39	40.91	42.23	43.29	41.68	41.11	41.22	41.54	-
	Czech Rep.	43.18	42.73	44.16	42.14	42.43	41.70	39.48	38.94	40.69	-
	Estonia	39.95	37.09	38.95	38.18	37.52	39.24	39.48	39.34	39.10	
	Latvia	45.17	40.14	37.69	37.50	37.99	37.95	36.85	38.01	38.63	-
	X	**39.41**	**38.15**	**37.91**	**39.16**	**42.00**	**41.70**	**40.31**	**40.16**	**40.36**	**-**

Source: OECD (2020).

Figure 1. The Public Size of Developed and Developing Countries



As seen in Figure 1; following The 2008 World Financial Crisis, the public expenditure of the developed countries and developing ones started diverging from each other and move in the inverse direction. But they seem to have converged between 2012 and 2014. After 2016 their expenditure value seems to be stable between %40-42 and move horizontally. In sum, The 2008 World Financial Crisis seems to have affected the trend of public expenditure.

3. LITERATURE REVIEW

Upon examination of the studies conducted on the optimal level of government spending in GDP, it has been established that Friedman's study (1997) is the first of the pioneering studies carried out on this subject. According to Friedman (1997), the share of government spending in GDP varies from 15% to 50%. The results of other studies in the field are provided in Table 3.

Table 3. Studies Conducted on the Optimal Value of Public Size

Study	Countries Included	Findings
Karras (1996)	118 countries	23 %of GDP for ali countries, 14% of GDP for OECD Countries, 3 3% of GDP for USA, 12% of GDP for Turkey.
Karras (1997)	20 European Countries	Optimal Public Size is 16% (%±3) of GDP
Chao and Grubel (1998)	Canada	Optimal Public Size is 34% of GDP.
Vedder and Gallaway (1998)	USA	The optimal Public Size is 17.5% of GDP.
Facclıini and Melki (2001)	France	Optimal Public Size is 30% of GDP.
Pevcin (2004a)	12 European Countries	Optimal Public Size is 36-42% of GDP.
Pevcin (2004b)	8 West European Countries	Optimal Public Size is 36-42% of GDP.
Kuştepeli (2005)	14 European Countries	Optimal Public Size is 26-47% of GDP.
Mavrov (2007	Bulgaria	Optimal Public Size is; for education expenditure 4.6% of GDP, for health expenditure 4.3 % of GDP, for social support expenditure 13.6 % of GDP.
Chobanov and Mladenova (2009)	81 countries	Optimal Public Size is 25% of GDP.
Altunç and Aydın (2013)	Turkey, Romania. and Bulgaria	Optimal Public Size is; for Turkey 25.21% of GDP, for Romania için 20.44% of GDP, for Bulgaria %22.45 of GDP.
Alimi (2014)	Nigeria	Optimal Public Size is 13.4% of GDP.
Turan (2014)	Turkey	Optimal Public Size is; for 1950-2012 term 8.80% of GDP, for 1970-2012 term 15.4% of GDP.
Pamuk and Dündar (2016)	Turkey	The optimal Public Size is 23.5% of GDP.
Bayrak (2020)	Turkey, Bulgaria, and Tunisia	Optimal Public Size is; For Turkey 23.03% of GDP, for Bulgaria 22.78% of GDP, for Tunisia 21.77% of GDP.

Source: Created by the author of the study.

Examining Table 3, it has been seen that the size of the government within the economic structure is still a controversial issue. It is indicated that on one hand, along with the involvement of the government, economic growth is also encouraged by the increasing perception of the safety of property rights (Ram, 1986; Brumm, 1997); on the other hand, the increasing government spending crowds out the investment decisions of the private enterprise (Heitger, 2001) and affects negatively the non-public innovation process (Schumpeter, 1934).

4. METHODOLOGY

4.1. Data Set

The variables of the study and their sources are indicated in Table 4.

Table 4: Variables and their Definitions

	Variables	Definition of Variables	Expected Sign	Source
Dependent V ariable	**LNGDP**	GDP Growth Rate		World Bank (WB)
	LNGSPE	The Rate of Public Spending to GDP	+	

	LNGSPE²	The Square of Rate of Public Spending to GDP	—
Independent Variables	**LNGFCF**	The Annual Rate of Change of Gross Fixed Capital Formation	+
	LNUNEMP	Unemployment rate (% of the total labor force)	—
	D2008	Dummy Variable (for estimating the effect of 2008 World Finacial Crisis)	—

The dependent variable of the study is the growth rate of real GDP. The first independent variable is the share of government spending in the real national income. Other independent variables are gross fixed capital formation* and unemployment rates, which are analyzed as control variables and have a very important role in growth models. These variables were obtained from the database of the World Bank (WB, 2020) and cover the period 1990-2019. Additionally, a dummy variable was used to determine the effects of the 2008 Global Financial Crisis. In that sense, while estimating the equation; 2008 and following years were coded to be "1" and also accepted as the years affected by this crisis.

4.2. Analysis Method

The following equation (1) has been created to test whether there is a reverse "U" relationship between growth and government spending.

$$GDPR_t = p_0 + P_1 LNGSPE_t + faLNGSPE? + [3_3 LNGFCF_t + 0_4 LNUNEMP_t + /\hat{i}_5 \ddot{o}2008_t + e$$
$$<o, <o<O \quad (1)$$

Here;
LNGSPE is the natural logarithm of government spending,
LNGSPE2 is the natural logarithm of the squared of government spending,
LNGFCF is the natural logarithm of gross fixed capital formation
LNUNEMP is the natural logarithm of the unemployment rate,
D2008 is a dummy variable that describes the 2008 World Financial Crisis, e is the error term.

The purpose of including the quadratic public expenditures (GSPE) in the equation is to identify the validity of the Armey Curve. Therefore, the negative and statistically significant coefficient 02 confirms the existence of the Armey curve. Considering the growth models; it is expected that the coefficient 03 of Fixed Capital Formation (GFCF) will be positive and statistically significant; the coefficient 04 of the Unemployment Rate (UNEMP will be negative and significant, and that the coefficient 05, which is the coefficient of D2008 assigned as dummy variable representing the 2008 World Financial Crisis, will be negative and significant.

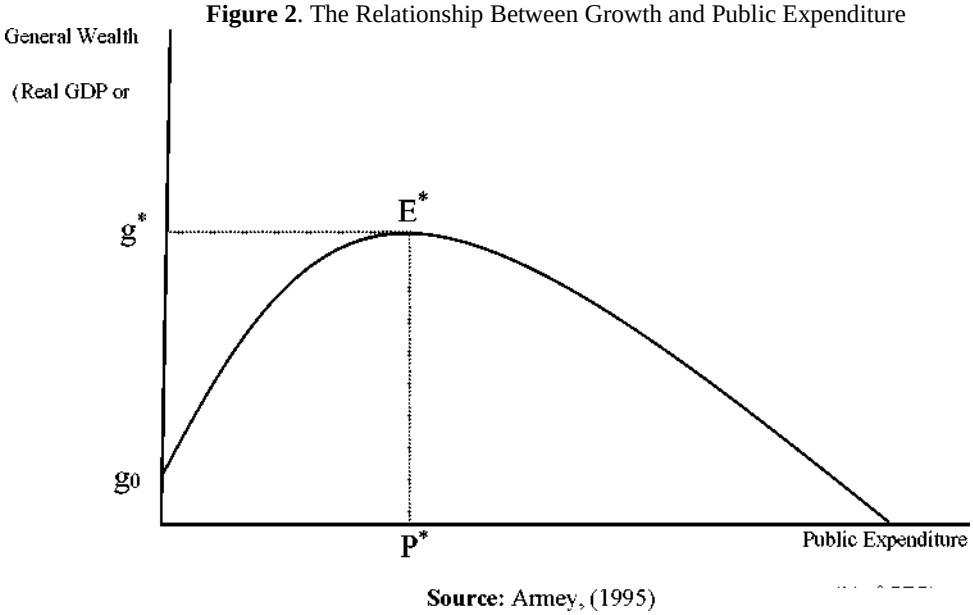
It has been observed that the threshold value studies on the optimal size of government have been conducted by using "inverse U curve" models called a BARS curve, which has been developed by Barro (1989), Armey (1995), Rahn et al. (1996) and Scully (1994, 2008). The Armey Curve used in this study has been briefly explained below.

Armey Curve (Figure 2), developed by Armey (1995), determines the optimal value of government (government spending/GDP) within the economic structure. According to the underlying logic of this curve, the number of conflicts that will increase in the lack of the presence of the state will make it difficult to maintain property rights. Also, due to the increasing uncertainty, the willingness to invest and save will decline and the output will be at (g_0) level (Chao and Grubel, 1998:55). In this case, economic growth may even be zero (Mavrov, 2007:55). As a result of the state's intervention in the economy, along with the increased infrastructure, defense-education-health investment, and spending, finally, growth will increase to the level of (g*). At this point (E *), the marginal efficiency of public spending gets equal to the marginal efficiency of private-sector spending, and the law of diminishing returns begins. Additionally, the tax burden imposed by the state due to the increased financing of public services increases. The increased tax burden cause to decrease in both state revenues (Mitchell, 2011:330) and the willingness of individuals to invest and save. In

* Considering literature, there are a substantial amount of study (Kormendi and Meguire, 1985; Ram, 1986; Barro, 1991; Mankiw et al., 1992; De Long and Summers, 1992; Levine and Renelt, 1992; Adhikary, 2011; Uneze, 2013; Keho, 2017) that determined the relationship between gross fixed capital formation and growth.

short, after this point, the increase in public spending leads to a decline in the rate of economic growth. To avoid this reality, public expenditure needs to be reduced.

Figure 2. The Relationship Between Growth and Public Expenditure



Source: Armey, (1995)

Within this framework, equation (2) is used to determine the optimal defense spending.

Optimal Public Size = - /?1 / 2(fi2) *(2)*

5. EMPIRICAL FINDINGS

The descriptive statistics of variables are provided in Table 5.

Table 5. Descriptive Statistics of Variables

	lngdp	**lngfcf**	**lngspe**	**unemp**	**lngspe^2**
Mean	2.4386	4.4787	2.7405	7.7962	5.4810
Median	2.4782	4.4927	2.8610	7.8134	5.7221
Maximum	3.1970	4.8802	3.3874	37.8678	6.7748
Minimum	-4.6051	-2.6592	-0.0943	0.08453	-0.1886
Standard Error	0.3910	0.3014	0.4742	0.6543	0.9484
Number of Observations	629	629	629	629	629

Note: lngdp is the natural logarithm of GDP; lngfcf is the natural logarithm of gross fixed capital formation; lngspe is the natural logarithm of government spending and lngpse^2 is the natural logarithm of the squared of government spending.

As part of the cross-sectional dependency test, the CD test developed by Pesaran (2004) was used because of N > T. The findings obtained from the cross-sectional dependency test are presented in Table 6.

Table 6. The Results of CD Test

Variable	**Test statistics**
lngdp	19.6234***
lngfcf	9.8876***
İnemp	11.3421***
lngspe	16.6292***
lngspe^2	16.6293***

Note: ***, **, and * represents 1%, 5% ve 10% significance level respectively.

As can be seen, there is a cross-sectional dependency in the series. Therefore, the unit root properties of the variables have been examined using Dickey-Fuller (Cross-Sectionally Augmented Dickey-Fuller (CADF-CIPS)) test (Pesaran, 2007:267-269), which was developed by Pesaran (2007) and takes into account the cross-sectional dependency. The results of the CIPS Test, which is the second generation unit root test, have been provided in Table 7. The test result shows that all series are stationary.

Table 7. The Results of Unit Root Test of CIPS

Variables	**CIPS**
lngdp	-4.146***
lngfcf	-4.144***
lnemp	3.4567***
lngspe	-2.722***
$lngspe^2$	-2.722***

Note: The model with constant and trend was estimated. ***, **, and * represents 1%, 5% ve 10% significance level respectively. Critical values for CIPS Tests were obtained from the Pesaran (2007:280) for 1%, 5%, and 10% significance levels, and they are -2.57, -2.33, and -2.21 respectively.

Before selecting the long-term estimator, the Delta Test was conducted to determine whether the coefficients are homogeneous or heterogeneous; the respective results are provided in Table 8 below. As can be seen, the coefficients are heterogeneous.

Table 8. Results of Homojenity/Heterojenity Test of Coefficients

	Delta	**p-value**
	21.886	0.000
Adj.	24.470	0.000

From this point, the Augmented Mean Group Estimator developed by Eberhardt and Bond (2009 was used. The first reason for using this estimator is that it takes into account the cross- sectional dependency. Secondly, the AMG estimator can be used in cases where the series become stationary if the first-order difference is taken. Thirdly, it is an effective estimator when it comes to the endogeneity problem caused by the error term. It also provides the individual coefficients for the case where the coefficients are heterogeneous, as well as the coefficients of the panel for the case where the coefficients are homogeneous. Besides, it is superior to other estimators indicated in the literature since it estimates the mean of individual coefficients by weighting (Yaman-Songur, 2017: 117-133).

Table 9. The AMG Results of Model

lngfcf	1.8410***
lnemp	1.1897***
lngspe	9.1995***
lngspe^2	-0.1759***
d2008	-0.0037***
Constant	-4.7110***
RMSE	0.2420
Number of Observations	630
Time	30
Number of Groups	21

Note: ***, **, and * represents 1%, 5% ve 10% significance level respectively.

Considering the whole model, the optimal public size is determined to be approximately 26.15%. The signs of employment and gross fixed capital formation seemed to be positive and significant as expected. Additionally the government spending at the left side of the curve before the point (E*) seems to have been positive as expected. At the same time, it has been observed that the 2008 World Financial Crisis also had a negative and significant impact on GDP.

The results obtained in terms of country basis are provided in Table 10.

Table 10. The AMG Results of Countries (Separately)

Development Level	Countries	lngspe	lngspe2	lngfcf	lnunemp	d2008	Constant
Developed Countries	USA	3.3062***	-0.0529***	2.1846***	-2.5634***	-0.0328***	-7.0385***
	UK	23.6955**	-0.3543*	0.6743**	-0.86621***	0.0376**	1.5125**
	Germany	14.4362**	-0.2556**	3.8073***	-2.5643***	-0.0018**	-13.1000**
	Spain	19.8604	-0.3193	2.2104***	-2.6674***	0.0149	-5.6301*
	France	6.02911**	-0.0969**	2.7009***	-2.3458***	-0.0589**	-10.2853***
	Italy	5.6907**	-0.0959**	2.2939***	-2.1456***	-0.0293**	-7.3165*
	S. Korea	5.1969**	-0.0865**	2.8240***	-2.9877***	-0.0364*	-9.6317***
	Japan	11.3921**	-0.1709**	2.7430***	-2.3131***	0.0612*	-3.6842***
	Canada	16.3795	-0.2826**	1.8133***	-1.9867***	-0.0131*	-3.9309*
	Netherland	4.5584*	-0.0760**	0.8882***	-2.3990***	-0.0272**	-1.0108**
Developing Countries	Turkey	17.9681**	-0.3658*	2.4851***	-2.4111***	0.2936***	-6.8966***
	Greece	58.5947**	-1.1127**	4.0620**	-2.9087**	0.2744**	-9.2573**
	Mexico	3.0528	-0.0530	2.3000***	-2.8996***	0.1174	-7.6238***
	Israel	23.6065**	-0.4087*	1.3513***	-1.9072**	-0.1224*	-0.8297
	Colombia	9.7671**	-0.2087***	1.0826***	-3.4421**	0.0423	-1.2090
	Brazil	4.2693	-0.0915	2.7679***	-2.1458***	-0.0609	-10.5027***
	Algeria	2.0833**	-0.0464**	-0.7164**	-2.9114**	-0.0066**	6.0248***
	Pakistan	1.1500**	-0.0229**	1.2661***	-3.0113***	-0.0254	-2.9788***
	Tunisia	19.3346**	-0.3687***	1.4823***	-2.6655***	-0.0674*	-1.9699**
	Nigeria	4.9408**	-0.0962**	0.4399**	-2.0241**	-0.2550*	-0.4915**
	Malaysia	15.892***	-0.3019**	-0.0402**	-1.8991***	-03.46**	1.1292**

In light of the results obtained; the Armey curve was observed to be valid in 18 other countries except for Spain, Mexico, and Brazil, as shown in Table 10. In other words, it is possible to allege that there is the optimal size of government spending in 18 countries.

Table 11. The Optimal Values of Countries

Development Level	Countries	Is Armey Curve valid?	Optimal Value of Countries
	USA	Yes	31.25

Developed Countries	UK	Yes	33.44
	Germany	Yes	28.24
	Spain	No	-
	France	Yes	31.11
	Italy	Yes	29.67
	South Korea	Yes	30.04
	Japan	Yes	33.33
	Canada	Yes	28.98
	Netherland	Yes	29.99
	x		**30.67**
Developing Countries	Turkey	Yes	24.56
	Greece	Yes	26.33
	Mexico	No	^B
	Israel	Yes	28.88
	Colombia	No	^B
	Brazil	Yes	23.33
	Algeria	Yes	22.45
	Pakistan	Yes	25.11
	Tunisia	Yes	26.22
	Nigeria	Yes	25.68
	Malaysia	Yes	26.32
	x		**25.43**

As shown in Table 11, the optimal rate of government spending of developed countries equals 30.67% on average, while, in developing countries, it amounts to 25.43%. Therefore, a significant difference of approximately 5% has been observed between the average values of govemment spending of both groups. This is consistent with Wagner's "Law of Increasing State Activities". Besides, when the public spending in the world has been examined över the past 20 years (see Table 1), the average of the Euro Area (47.7%) and the average of the developed countries (39.3%) are observed to be quite high compared to the average of developing ones (28.8%), and the average of Southeast Asian countries (20.8%).

6. CONCLUSIONS AND RECOMMENDATIONS

Considering the non-linear structure of the Army (1995) Curve, the study analyzed whether there is an optimal value for government spending, if there is any, and whether this value differs depending on the countries' level of development. The model established for the study uses data, which is generated between the period 1990-2019 from 21 countries, 10 developed and 11 developing.

The study findings confirmed the existence of an optimal value of government spending in 18 other countries, except Spain, Mexico, and Colombia. Both signs and values of the coefficients of the variables in these 18 countries seem to be as expected. Also, it could be put forward that Armey Curve is valid. Correspondingly, it is possible to argue that the existence of an optimal rate of government spending will ensure economic growth.

Concerning the optimal values of government spending by countries, it has been observed that the average optimal rate of government spending in developed countries equals 30.67% of GDP, whereas this rate is 25.43% of GDP in developing countries. Taking into account these findings, it is possible to state that the average optimal rates of government spending of developed and developing countries differ considerably. This conclusion is consistent with that of Wagner's (1883), and with Keynesian views. Based on this conclusion, in developed countries, it is possible to argue that with the increase of real income of individuals, the involvement of the state in the economic structure is greater than that of developing countries. State involvement in the economy is related to the growing need for infrastructure as well as educational, health, security, and social needs.

The study has confirmed once again the positive impact of fixed capital investments on growth. At this point, the involvement of the state in the economy has become inevitable, as seen in the COVID-19 crisis. Examining the economy of the developed and developing economies, it is observed that the size of the government in the economy varies in the range of 30-57% (see Table 2). It is therefore recommended that the state further emphasize the investment-oriented and growth- driving approach that contributes to the formation of fixed capital

in the coming period to increase competitiveness and ensure resource efficiency. However, given the negative impact of unemployment on growth, it can be stated that it would be appropriate to increase the number of active labor market programs that will reduce the number of unemployed ones, which has reached a much higher level, especially with the COVID-19 crisis.

7. LIMITATIONS OF THE STUDY AND FUTURE IMPLICATIONS

Concerning the limitations of this study, it should be noted that the main limitation was the coverage of data restricted to the years 1990-2019. Besides, it seems that the studies on threshold values have been mostly carried out by using Armey, Rahn, Scully, and BARS curves. The results in this study were obtained from the analysis conducted with the Army Curve. Since the impact of other variables on growth has been considered constant (ceteris paribus) in the analysis with Army Curve, these constraints should be taken into account when generalizing.

The most important implication for future studies is to test these results with various methods of analysis to increase their validity. Besides, it is possible to say that the explanatory power of the study can be improved by changing the method of analysis and expanding the data set to cover not only extended periods but also different countries.

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GENİŞLETİLMİŞ ÖZET

Amaç

Bu çalışmanın ana amacı kamu harcamalarının optimal bir değerinin olup olmadığı; varsa bunun ülkelerin gelişmişlik seviyesine göre değişip değişmediğini test etmektir.

Metodoloji

Çalışmanın bağımlı değişkeni reel GDP büyüme oranıdır. Çalışmanın birinci bağımsız değişkeni ise kamu harcamalarının reel milli gelir içindeki oranıdır. Diğer bağımsız değişkenleri ise kontrol değişkeni olarak analize alman ve büyüme modelleri içinde oldukça önemli bir yere sahip Gayri Safî Sabit Sermaye Oluşumu† ve İşsizlik oranlarıdır. Bu değişkenler de Dünya Bankası (WB, 2020) veri tabanından temin edilmiş olup 1990-2019 dönemini kapsamaktadır. Çalışmada 2008 krizlerinin etkilerini de görmek amacıyla, bu dönemi temsilen kukla değişken kullanılmıştır.

Büyüme ve Kamu harcamaları arasında ters "U" şeklinde bir ilişkinin olup olmadığmı test etmek için aşağıdaki (1) numaralı denklem oluşturulmuştur.

$$GDPRt=p_0+\text{^LNGSPEt+/L/VGSPE/+}fLI.\text{\'(ı I'CI',+/A/VU.VE.V/P,+}p))0088+et$$

$$P2,P<<0 \quad (1)$$

Denklemdeki karesel yapıdaki kamu harcamalarının (GSPE) denkleme sokulma maksadı Armey Eğrisi'nin geçerli olup olmadığmı test içindir. P2 katsayısının negatif ve istatistik! olarak anlamlı olması, Armey eğrisinin var olduğunu ifade eder. Büyüme modelleri göz önüne alındığında; Sabit Sermaye Oluşumunun (GFCF) katsayısı olan P3'ün pozitif ve istatistiki olarak da anlamlı; denkleme dahil edilen İşsizlik Oranına (UNEMP) ait katsayı P4'ün işaretinin negatif ve anlamlı; 2008 Dünya Finansal Krizi'ni temsilen kukla değişken olarak atanan D2008'in katsayısı olan Ps'in işaretinin negatif ve anlamlı olması beklenmektedir.

Analiz Eberhardt ve Bond (2009)'m geliştirdiği AMG tahmincisi (Augmented Mean Group Estimator) ile yapılmıştır. Bu tahminci üç temel sebeple tercih edilmiştir. Bunlar sırayla; AMG tahmincisinin yatay kesit bağımlılığını dikkate alması; birinci dereceden farkı alamarak durağan hale gelen serilerin analizinde kullanılıyor olabilmesi ve en nihayetinde de hata terimi kaynaklı içsellik probleminde etkin olan bir tahminci olmasıdır. AMG tahmincisi hem panelin geneline ait sonuçları sunmakta, hem de katsayıların heterojenliği durumunda bireysel katsayıları verebilmektedir. Bireysel katsayıların ortalamasını ağırhklandırarak tahminlediği için, diğer tahmincilere kıyasla daha üstün olduğu da söylenebilir (Yaman-Songur, 2017:117-133).

Bulgular

Çalışmadan elde edilen bulgulara göre; İspanya, Meksika ve Kolombiya hariç diğer 18 ülkede optimal kamu harcaması değerinin varlığı doğrulanmıştır. Bununla birlikte; gelişmiş ülkelerde optimal kamu büyüklüğü ortalamasının GDP'nin %30.67'si, gelişmekte olan ülkelerde ise bu değerin %25.43 olduğu gözlenmiştir. Dolayısıyla kamu harcamalarının her iki grup arasındaki ortalama değerleri arasında yaklaşık olarak %5 gibi oldukça önemli bir fark gözlenmiştir

Sonuç ve Tartışma

Birinci araştırma sorusu kapsamında; İspanya, Meksika ve Kolombiya hariç diğer 18 ülkede optimal kamu harcaması değerinin varlığı doğrulanmıştır. Bu 18 ülkede değişkenlere ait katsayıların hem işaret hem de değerlerinin beklenen yönde olduğu gözlenmiştir. Dolayısıyla, Armey Eğrisi'nin geçerli olduğu ifade edilebilir. Bir diğer deyişle, ekonomik büyümeyi temin edecek optimal kamu harcaması oranın varlığından söz etmek mümkündür.

İkinci araştırma sorusu kapsamında; ülkeler bazmda ayrı ayrı tespit edilen optimal kamu harcama değerlerinden yola çıkarak; gelişmiş ülkelerde optimal kamu büyüklüğü ortalamasının GDP'nin %30.67'si; gelişmekte olan ülkelerde ise optimal kamu harcama değeri ortalamasının %25.43 olduğu gözlenmiştir. Bu düşüncelerle gelişmiş ve gelişmekte olan ülkelerin optimal kamu büyüklüğü ortalamalarının oldukça farklılaştığını ifade etmek mümkündür. Bu sonuç, Wagner (1883), ve Keynesyen görüş ile tutarlılık içindedir. Buradan hareketle gelişmiş ülkelerde reel gelirin artmasıyla başta sanayinin artan altyapı ihtiyacı ile eğitim, sağlık, güvenlik ve sosyal ihtiyaçlardan dolayı kamunun iktisadi yapı içindeki varlığının gelişmekte olan ülkeler göre daha fazla olduğunu söylemek mümkündür.

† Literatür incelendiğinde; sabit sermaye oluşumu ve ekonomik büyüme arasındaki pozitif ilişkinin varlığım ortaya koyan oldukça fazla çalışma (Kormendi ve Meguire, 1985; Ram, 1986; Barro, 1991; Mankiw et al., 1992; De Long ve Summers, 1992; Levine ve Renelt, 1992; Adhikary, 2011; Uneze, 2013; Keho, 2017) olduğu görülmektedir.

Bununla birlikte; yapılan bu çalışmayla da sabit sermaye yatırımlarının büyüme üzerindeki pozitif etkisi bir kez daha doğrulanmıştır. Bu noktada, COVID-19 krizinde de görüldüğü üzere devletin iktisadi hayat içindeki varlığı kaçınılmaz bir hal almıştır. Gelişmiş ve gelişmekte olan ekonomiler incelediğinde de kamunun ekonomideki büyüklüğünün %30-57 aralığında değiştiği (Bkz. Tablo 2) görülmektedir. Dolayısıyla devletin rekabeti artırmak, kaynak etkinliğini sağlamak üzere önümüzdeki dönemde sabit sermaye oluşumuna katkı sunan, yatırım odaklı ve büyümeyi teşvik eden anlayışı daha da ön plana çıkarması önerilmektedir. Bununla birlikte büyüme üzerinde işsizliğin negatif etkisi göz önüne alındığında; özellikle COVID-19 kriziyle çok daha yüksek oranlara ulaşan işsiz değerlerini azaltacak Aktif İstihdam Programlarının artırılmasının uygun olacağı ifade edilebilir.

Ayrıca gelecekte alanda yapılacak çalışmalar için önerilecek en önemli husus ise bu sonuçların değişik analiz yöntemleriyle de denemesi ve geçerliğinin artırılmasıdır. Bunun yanında analiz yöntemi değiştirilmesi, veri setinin hem zaman ve hem de farklı ülkeler olacak şekilde genişletilmesiyle, çalışmanın açıklayıcı gücünün artırılabileceği ifade etmek mümkündür.